

Lake diatoms as indicators of land use effects, changing environmental conditions, and the effectiveness of management practices

Nathan J. Smucker^{1,2} and Naomi E. Detenbeck^{1,3}

¹U.S Environmental Protection Agency, Office of Research and Development, National Health and Environmental Effects Research Laboratory, Atlantic Ecology Division, Narragansett, RI

²smucker.nathan@epa.gov, 401-782-9624

³detenbeck.naomi@epa.gov, 401-782-3162

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Lakes continue to face escalating pressures associated with land cover change and growing human populations. The U.S. EPA National Lakes Assessment, which sampled more than 1000 lakes in a probabilistic survey, was the first large scale effort to characterize the condition of lakes across the country. The NLA data offer an abundance of opportunities to examine biodiversity patterns, drivers of ecosystem change, and effectiveness of management practices that reduce adverse effects of land cover change. Diatoms are particularly useful as indicators because they are important primary producers and their silica cell walls are preserved in sediments, which can be used to infer past conditions and how lakes have changed since European settlement. Results from analyzing the 249 reliable cores can be used in conjunction with current sediment assemblages (1) to understand how patterns of diversity have changed as a result of land cover alteration or other broad scale regional factors, (2) to compare the extent to which reference lakes with minimal human impacts have changed, and (3) to examine the likelihood of managing lakes back to pre-development conditions versus current regional reference site conditions. These results can be used to help refine assessments by potentially identifying the broad scale factors affecting lakes, which could then improve the characterization of landscape impacts in addition to setting realistic benchmarks of attainment for ecological conditions. On a regional scale, our research also focuses on developing indicators to evaluate the effectiveness of management practices in New England lake basins for the purpose of informing future decisions and restoration or conservation efforts.